DEM-DSD1796/PCM1795/PCM1796/PCM1798

DSD1796/PCM1795/PCM1796/PCM1798 Evaluation Module

User's Guide

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Read This First

About This Manual

This document provides the information needed to set up and operate the DEM-DSD1796/PCM1795/PCM1796/PCM1798 EVM evaluation module, a test platform for the 24-bit, 192-kHz, sampling stereo DSD1796, PCM1795, PCM1796, and PCM1798 audio digital-to-analog converters (DACs). For a more detailed description of these devices, refer to the specific device product data sheet available from the Texas Instruments web site at http://www.ti.com.

How to Use This Manual

Throughout this document, the abbreviation *EVM* and the term *evaluation module* are synonymous with the DEM-DSD1796/PCM1795/PCM1796/PCM1798 EVM. Unless specifically noted, the information presented in this manual applies to the DSD1796, PCM1795, PCM1796, and PCM1798 audio stereo DACs.

Chapter 1 describes the hardware setup guide for the EVM, including the necessary information required to configure the EVM switches and jumpers for product evaluation. This chapter also explains how to use the software provided with the DEM-DSD1796/PCM1795/PCM1796/PCM1798 EVM for controlling the DAC.

Chapter 2 includes the EVM electrical schematics, printed circuit board (PCB) layouts, and the bills of material for both the DEM-DSD1796/PCM1795/PCM1796/PCM1798, the DEM-AS/CDAC, and the DEM-DAI/ASDAC.

Information About Cautions and Warnings

This document contains caution statements.

CAUTION

This is an example of a caution statement. A caution statement describes a situation that could potentially damage your software or equipment.

The information in a caution or a warning is provided for your protection. Please read each caution and warning carefully.

If You Need Assistance

If you have questions regarding either the use of this evaluation module or the information contained in the accompanying documentation, please contact the Texas Instruments Product Information Center at (972) 644–5580 or visit the TI web site at www.ti.com.

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Description

The DEM-DSD1796/PCM1795/PCM1796/PCM1798 is an evaluation fixture for the DSD1796/PCM1795/PCM1796/PCM1798 series of 24-bit, 192-kHz sampling stereo DACs. This EVM provides all necessary connectors and circuitry for interfacing to audio test systems and commercial audio equipment.

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1.1 Functional Block Diagram

Figure 1-1 illustrates the functional block diagram of the DEM-DSD1796/PCM1795/PCM1796/PCM1798 EVM.

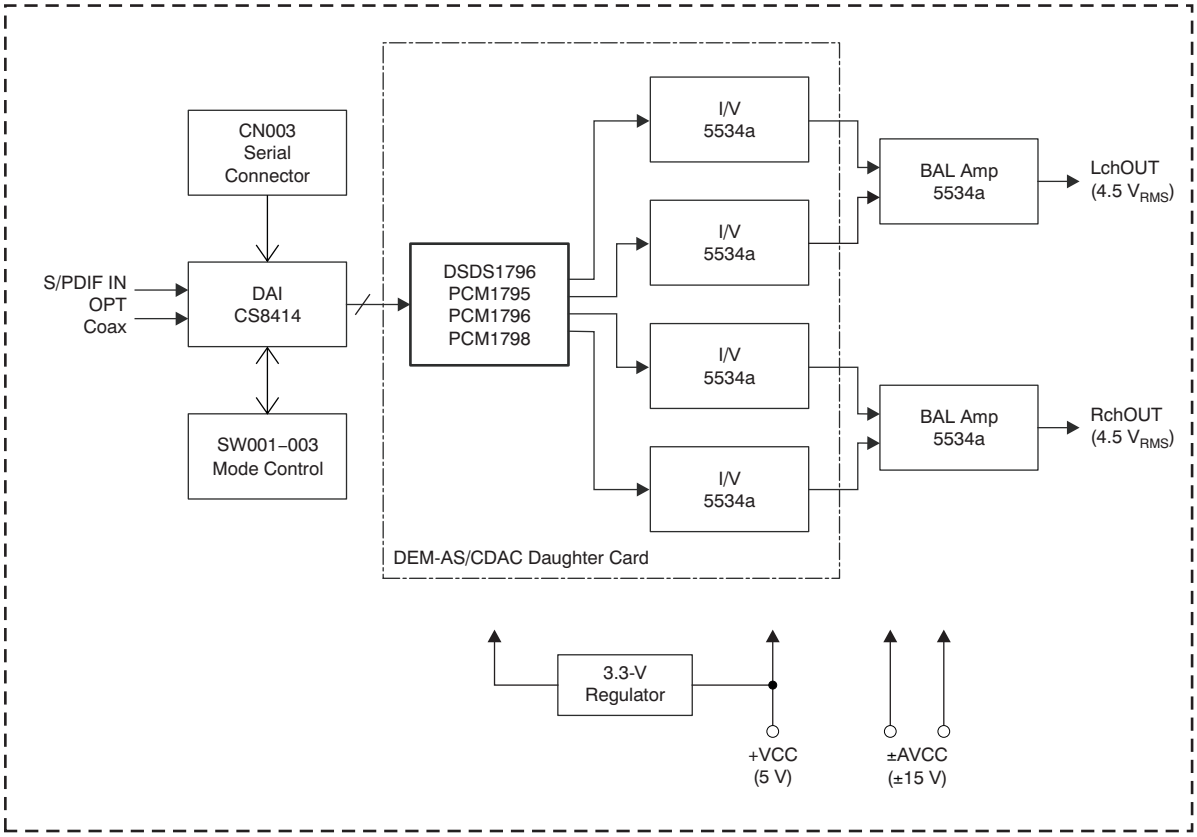

Figure 1-1. DEM-DSD1796/PCM1795/PCM1796/PCM1798 Block Diagram

1.2 EVM Features

The DEM-DSD1796/PCM1795/PCM1796/PCM1798 series of stereo DACs consist of a DAI (S/PDIF) section that uses a DSD1796/PCM1795/PCM1796/PCM1798 DAC section, a differential current/voltage (I/V) section, and a balanced amplifier with a post-low-pass filter (LPF) section.

The DEM-DSD1796/PCM1795/PCM1796/PCM1798 requires a 5-V digital power supply for its digital circuits, a 5-V analog power supply for the device itself, and a ±15-V analog power supply for the balanced amplifier circuits.

The DAI section has both coaxial and optical inputs that are switch-selectable and capable of handling sampling rates up to 96 kHz.

The DSD1796/PCM1795/PCM1796/PCM1798 accepts PCM audio data input at a sampling rate up to 192 kHz, or a 64-f_S DSD signal input, as determined by functional control settings and jumper connections on the board.

This evaluation fixture uses the DEM-DSD1796/PCM1795/PCM1796/PCM1798 demonstration board and demonstration software for functional evaluation and operational control of the DSD1796/PCM1795/PCM1796/PCM1798 DAC device.

1.3 System Requirements

The DEM-DSD1796/PCM1795/PCM1796/PCM1798 EVM has the following requirements:

- ±15-V analog power supply at AVCC+, AVCC–, and GND
- 5-V DAC power supply at VCC and GND
- S/PDIF input (sampling rate f_S is up to 96 kHz) connected at the coaxial or optical connector
- RCA analog output connected at CN103 (Lch) and CN104 (Rch); analog full-scale output level is 4.5 V_{RMS}.
- PC connected to printer connector CN003 for demonstration software operation (if necessary)
- Appropriate test module:
  - DEM-PCM1795: for PCM1795
  - DEM-PCM1796: for PCM1796
  - DEM-DSD1796: for DSD1796
  - DEM-PCM1798: for PCM1798

1.4 Electrostatic Discharge Warning

Many of the components on the DEM-DSD1796/PCM1795/PCM1796/PCM1798 EVM are susceptible to damage by electrostatic discharge (ESD). Customers are advised to observe proper ESD handling precautions when unpacking and handling the EVM, including the use of a grounded wrist strap at an approved ESD workstation.

CAUTION

Failure to observe ESD handling procedures may result in damage to EVM components.

1.5 Function Control for DAI Interface Format

SW001, SW002, and SW003 are switches for controlling the audio interface format of the DAI receiver CS8414. The default audio interface format of the DSD1796/PCM1795/PCM1796/PCM1798 is I²S™ format. Table 1-1 lists the digital audio receiver configuration parameters.

Table 1-1. Digital Audio Receiver Configuration

SW001	SW002	SW003	Receiver Output Data Format
L	L	L	16- to 24-bit left–justified
L	H	L	16- to 24-bit I2S
H	L	H	16-bit right-justified (or standard)
L	H	H	18-bit right-justified (or standard)

1.6 Reset Operation

Pressing the SW004 pushbutton initiates a reset operation of the CS8414.

1.7 SW006 Operation Control for DAC

Switch SW006 is the register set and reset control for the PCM1796 and DSD1796. The RESET section of the switch must be set to *H* except to perform a reset operation. Table 1-2 shows the options for SW006.

Table 1-2. SW006 Options

SW006 RESET	Function
H	Normal operation (default)
L	Reset operation

1.8 Jumper Connection

JP001 selects the normal or inverted BCK signal for 24-bit left-justified or other formats (I^2S); the default position is I^2S.

1.9 Demonstration Software

Demonstration software is provided to control the PCM1796/DSD1796 internal register using a PC that is running the Microsoft® Windows® operating system. This software uses a printer cable to connect the PC to the DEM-PCM/DSD1796 connector CN003.

The demonstration software includes a total of five files in the DEM1796 directory of the supplied CD. These files are:

- DEM1796.exe
- DEM1796.ini
- Vbrjp200.dll
- Ver.dll
- Inpout.dll

To load the software, first copy these files to a convenient directory (folder), such as:

C:\DEM1796

Then, change the printer-port address in the *DEM1796.ini* initialization file to:

```
&H378, &H278, or &H3BC0
```

Most PCs use *&H378* as the default printer-port address.

Schematics, PCB Layout, and Bill of Materials

This chapter provides the DEM-DAI/ASDAC and the DEM-AS/CDAC printed circuit boards and schematics. The bill of materials (BOM) is included for component and manufacturer reference.

Note: Board layouts are not to scale. These are intended to show how the board is laid out; they are not intended to be used for manufacturing DEM-DAI1753/54/55 EVM PCBs.

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2.1 DEM-DAI/ASDAC Printed Circuit Board Layout

Figure 2-1 through Figure 2-3 illustrate the printed circuit board (PCB) layout for the DEM-DAI/ASDAC.

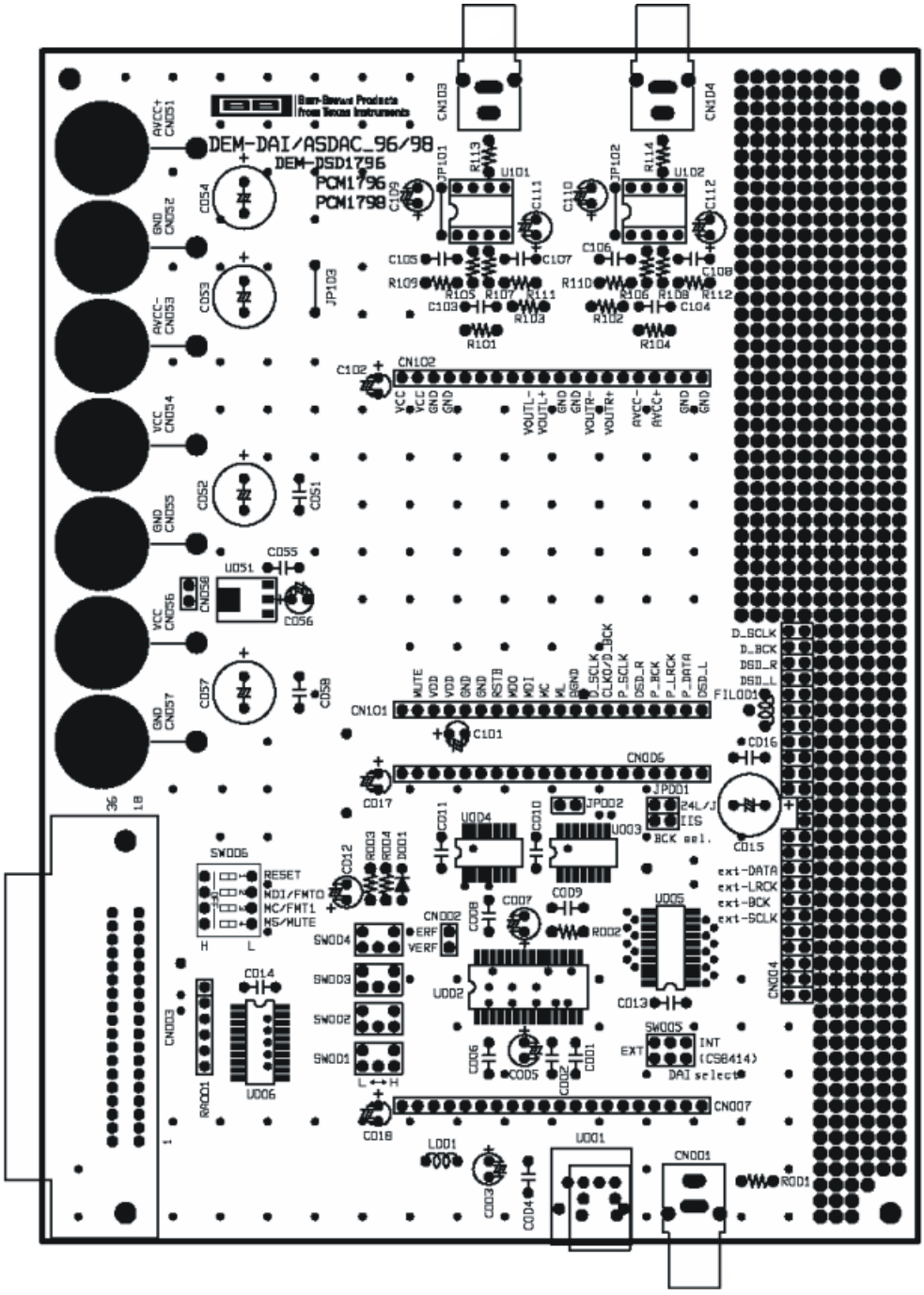

Figure 2-1. DEM-DAI/ASDAC Silkscreen

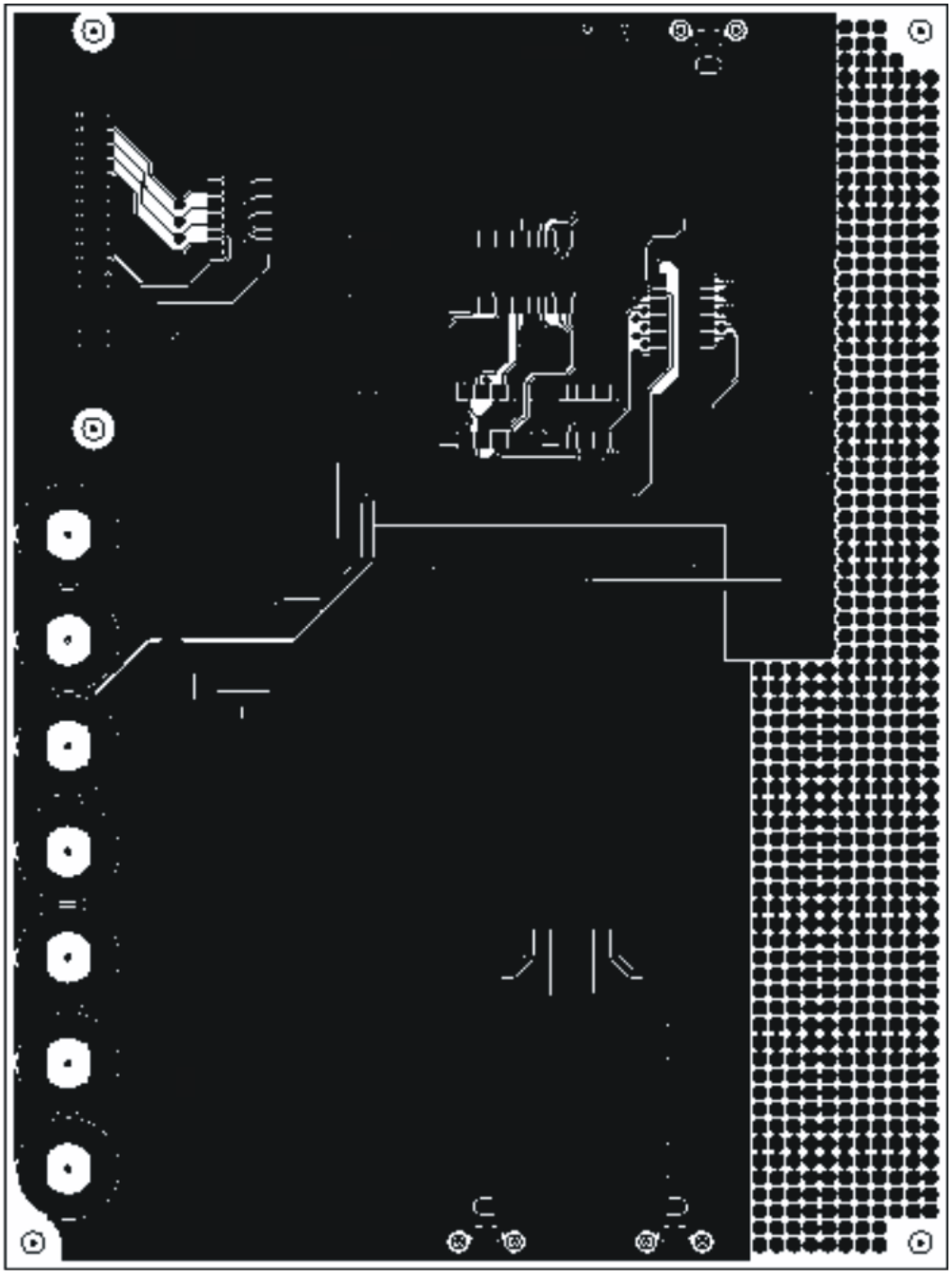

Figure 2-2. DEM-DAI/ASDAC (Top View)

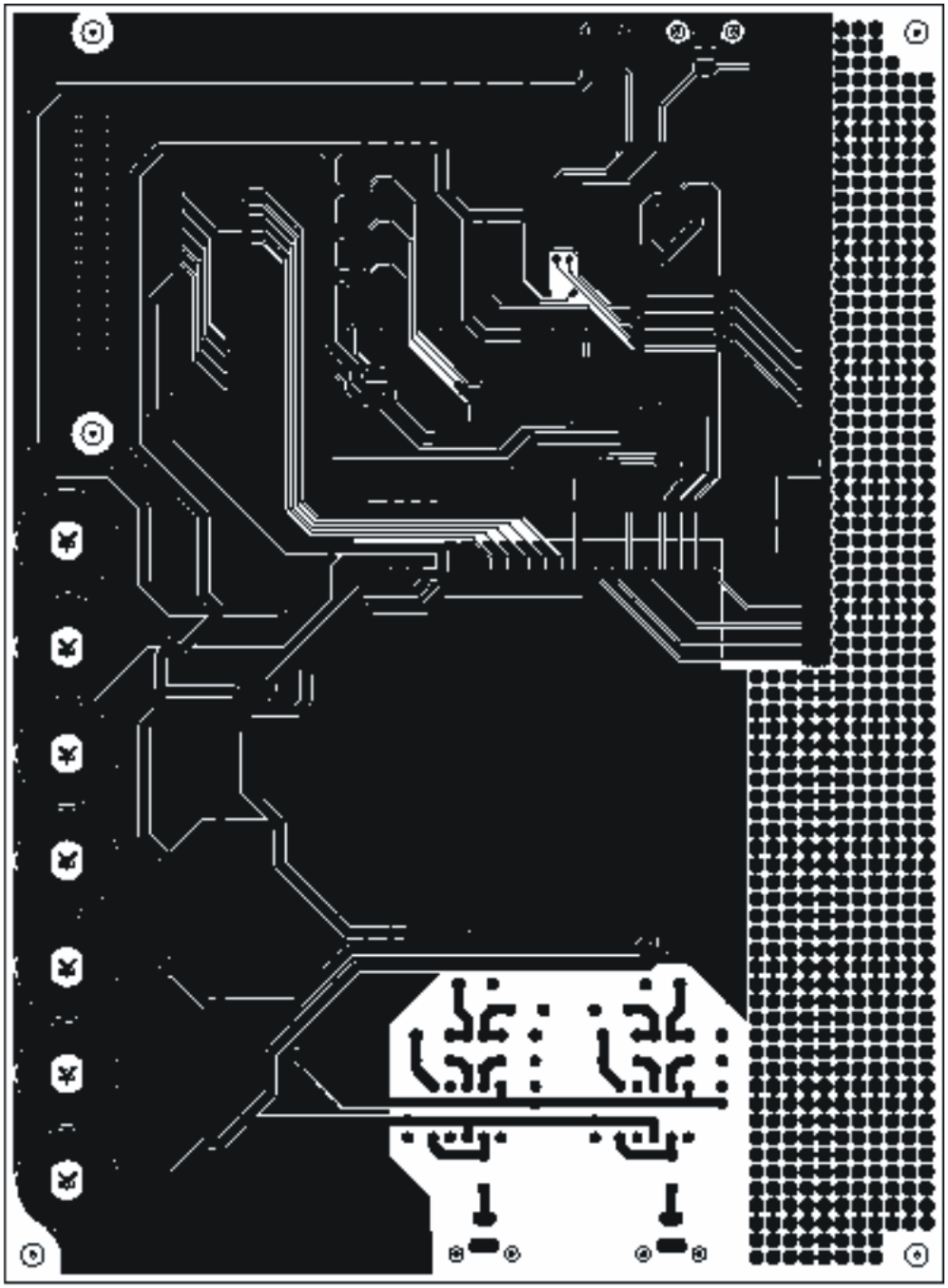

Figure 2-3. DEM-DAI/ASDAC (Bottom View)

2.2 DEM-AS/CDAC Printed Circuit Board Layout

Figure 2-4 through Figure 2-6 illustrate the PCB layout for the DEM-AS/CDAC.

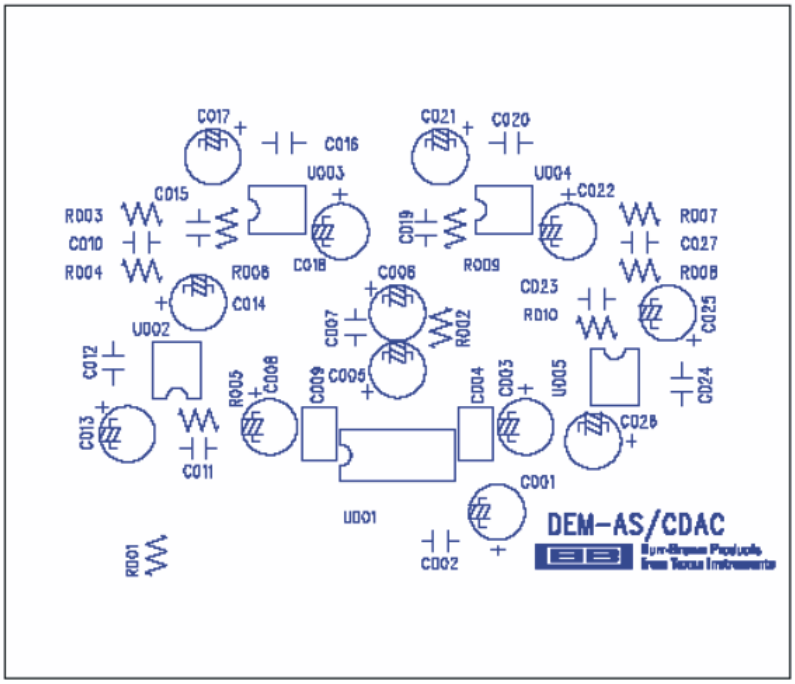

Figure 2-4. DEM-AS/CDAC Silkscreen

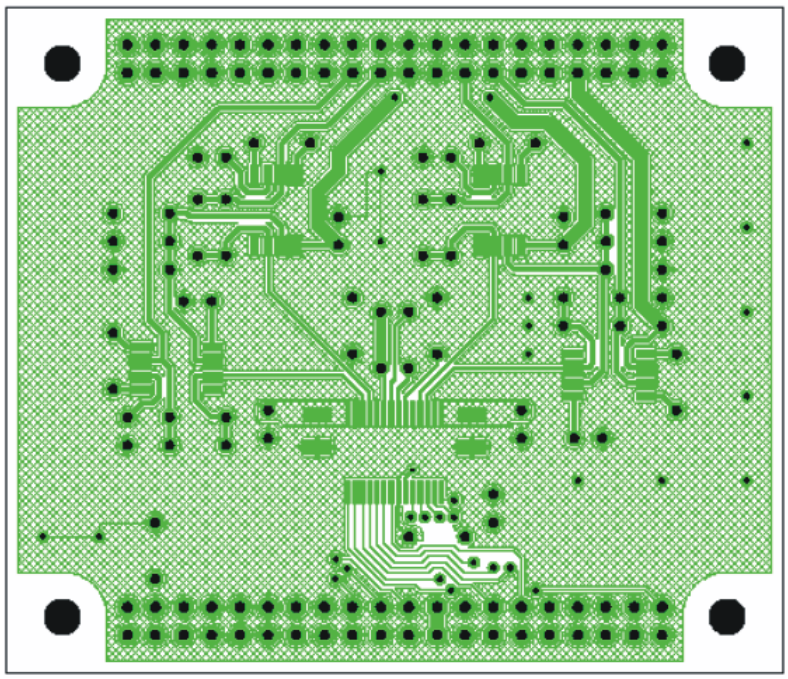

Figure 2-5. DEM-AS/CDAC (Top View)

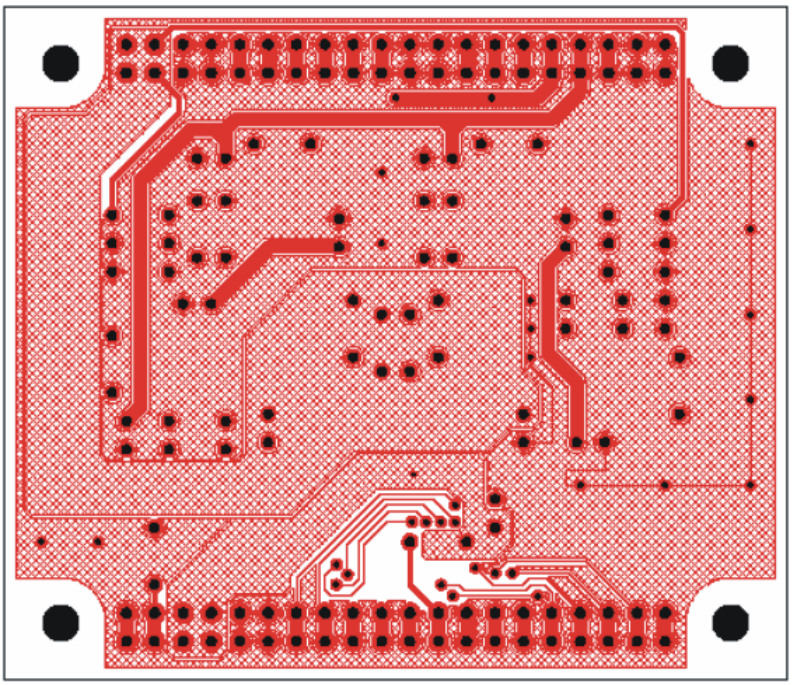

Figure 2-6. DEM-AS/CDAC (Bottom View)

2.3 DEM-DAI/ASDAC Schematics

The schematic for the sections of the DEM-DAI/ASDAC are shown in Figure 2-7 through Figure 2-9.

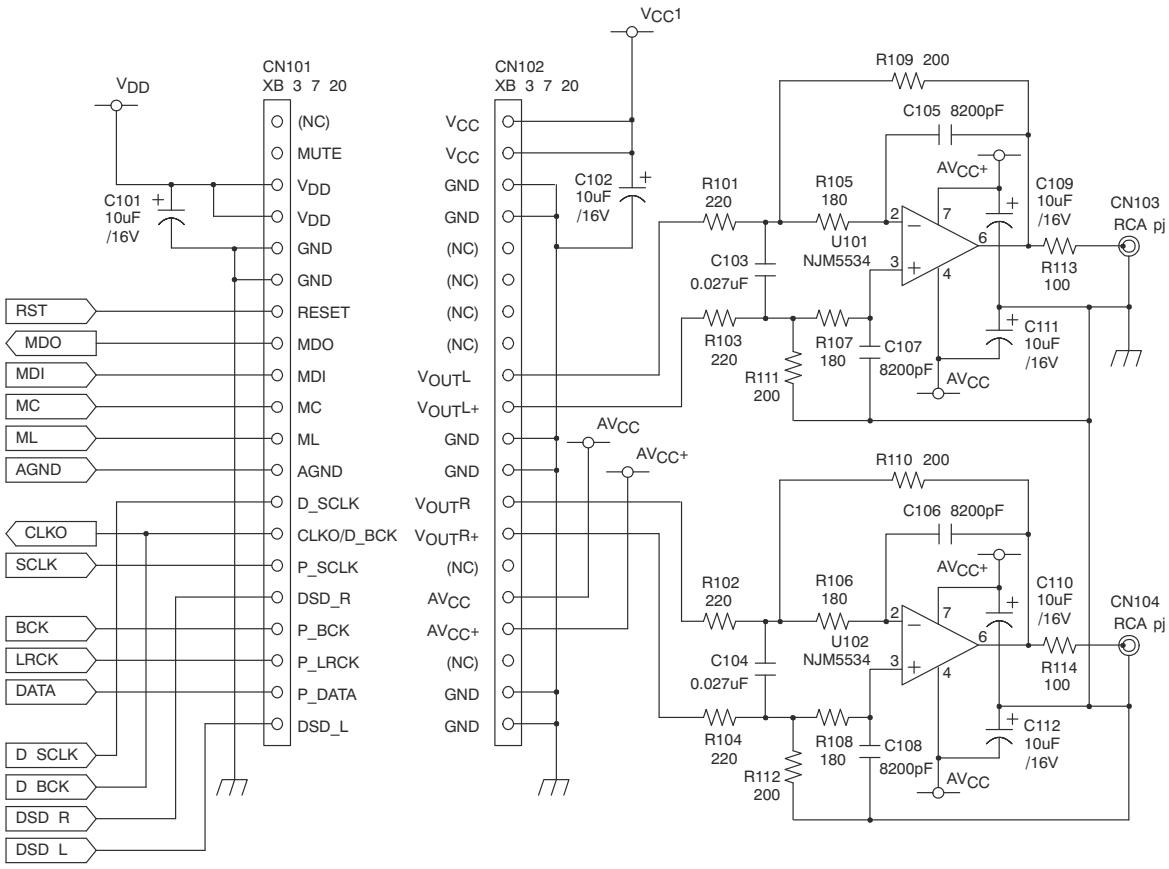

Figure 2-7. DEM-DAI/ASDAC Analog Section (Sockets for Daughterboard and Low-Pass Filter)

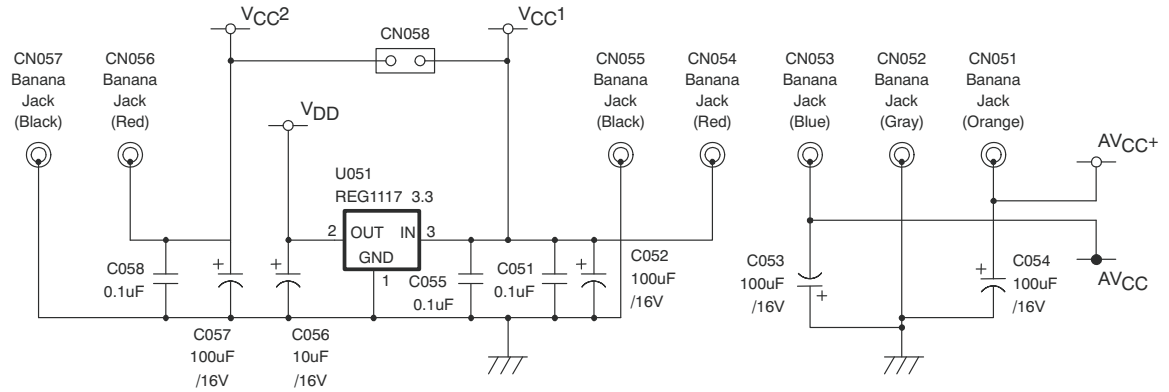

Figure 2-8. DEM-DAI/ASDAC Connector and Regulator

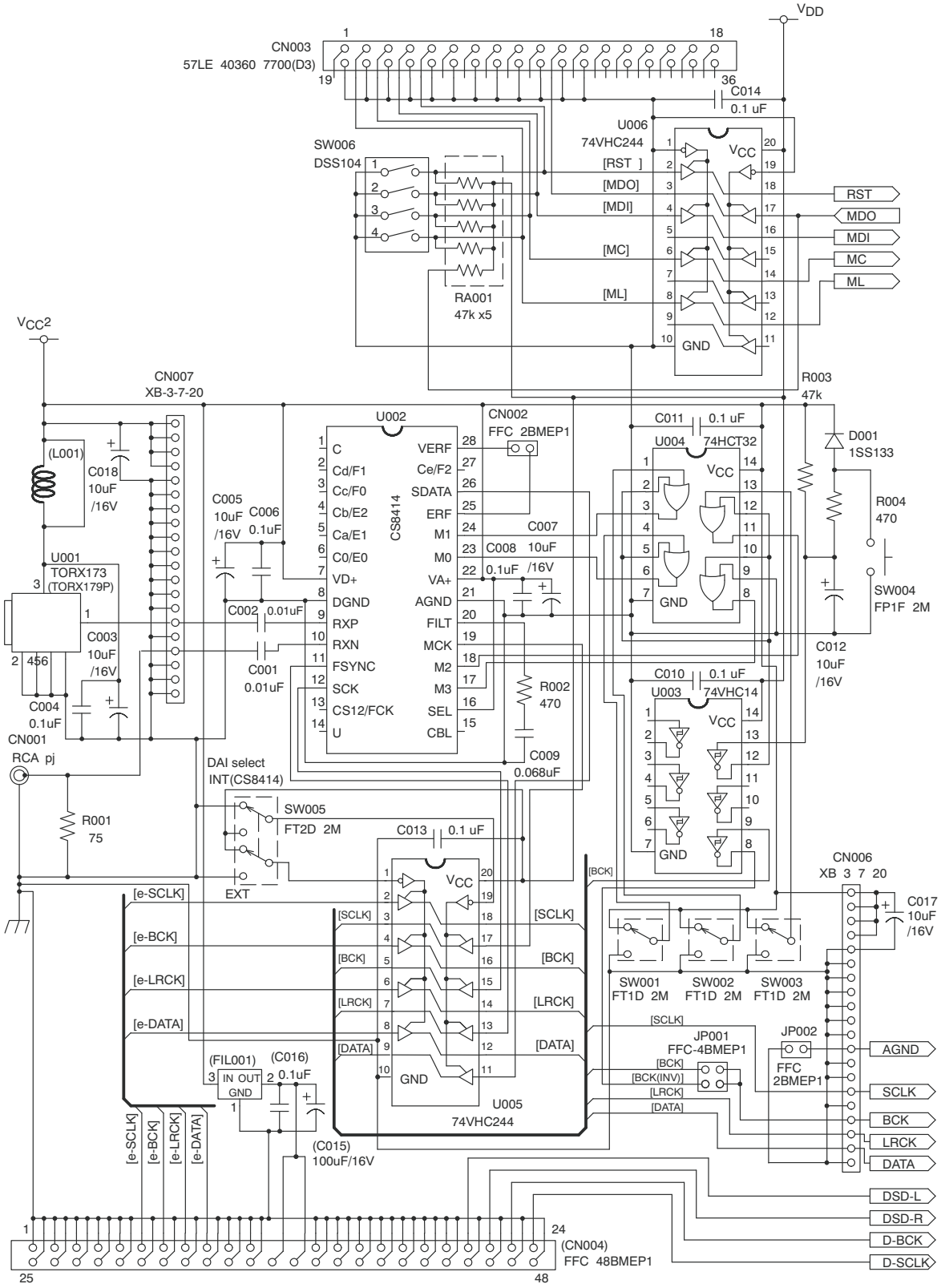

Figure 2-9. DEM-DAI/ASDAC Digital Section (Digital Audio Interface)

2.4 DEM-AS/CDAC Schematics

Figure 2-10 shows the schematic for the sections of the DEM-AS/CDAC.

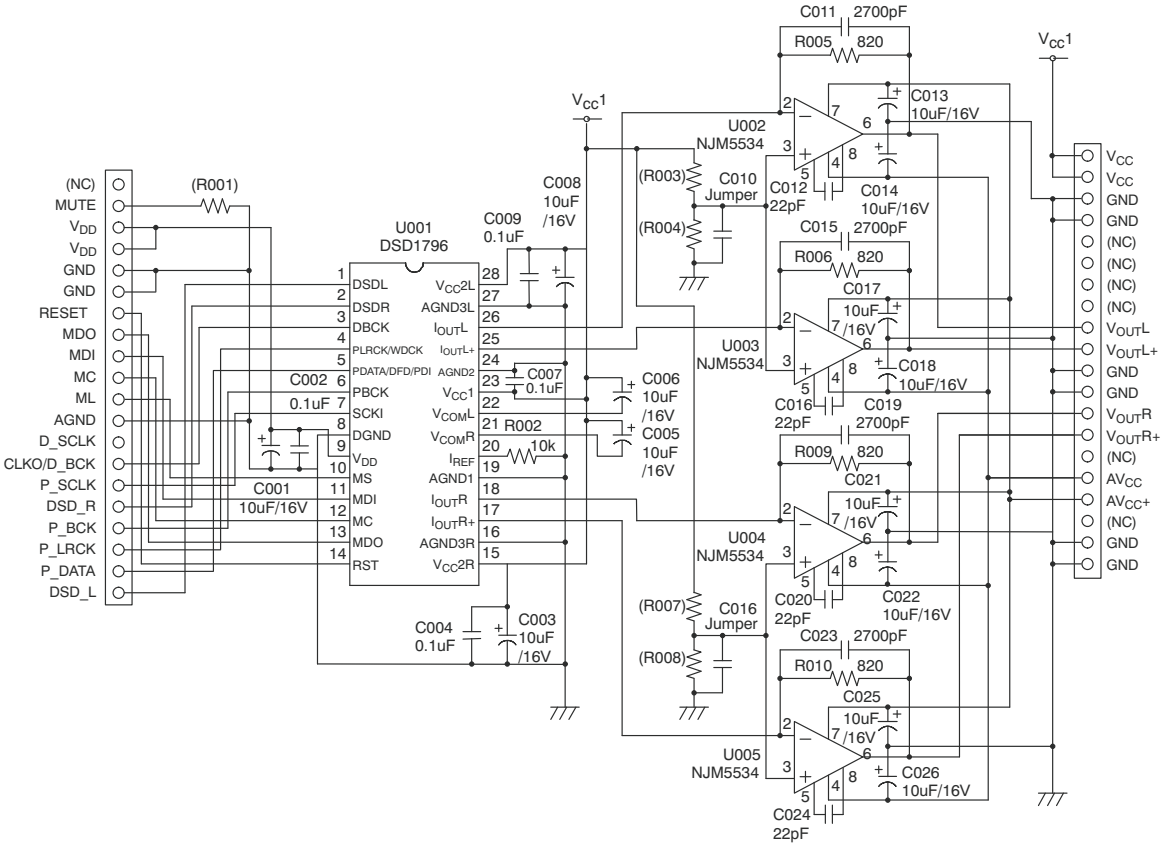

Figure 2-10. DEM-AS/CDAC

2.5 Component Lists

2.5.1 DEM-AS/CDAC_96/98 Parts List

Table 2-1 lists the bill of materials for the DEM-AS/CDAC_96/98.

Table 2-1. Bill of Materials

Qty	RefDes	Item	Value	Mfr Part No	Manufacturer	Remarks
11	C001, C003, C008, C013, C014, C017, C018, C021, C022, C025, C026	AL ELE capacitor	10 µF/16 V	ROA–16V100M	ELNA	
2	C002, C007	Film capacitor	0.1 µF	AMFF0050J104	Nissei	
2	C004, C009	Chip film capacitor	0.1 µF	ECHU1C104JB	Matsushita	
2	C005, C006	AL ELE capacitor	10 µF/16 V	ROA-16V100M	ELNA	
0	C010, C027	Film capacitor	0.1 µF	AMFF0050J104	Nissei	Jumper connection
4	C011, C015, C019, C023	Film capacitor	2700 pF	APSF0100J272	Nissei	
4	C012, C016, C020, C024	Ceramic capacitor	22 pF	RPE131CH220J50	Murata	
1	R001	Resistor	47 kΩ	SN14C2C–47kΩF	KOA	Not mounted
1	R002	Resistor	10 kΩ	SN14C2C–10kΩF	KOA	
2	R003, R007	Resistor	4.7 kΩ	SN14C2C–4.7kΩF	KOA	Not mounted
6	R004, R005, R006, R008, R009, R010	Resistor	820Ω	SN14C2C–820ΩF	KOA	R004, R008 not mounted
1	U001	DAC	28-pin, SSOP	DSD1796	TIJ	
	PCM1796					
	PCM1798					
4	U002, U003, U004, U005	Op amp	8-pin, SOP	NJM5534M	JRC	

2.5.2 DEM-DAI/ASDAC_96/98 Parts List

Table 2-2 lists the bill of materials for the DEM-DAI/ASDAC_96/98.

Table 2-2. Bill of Materials

Qty	RefDes	Item	Value	Mfr Part No	Manufacturer	Remarks
2	C001, C002	Film capacitor	0.01 µF	AMFF0050J103	Nissei	
7	C003, C005, C007, C109, C110, C111, C112	AL ELE capacitor	10 µF/16 V	ROA-16V100M	ELNA	
6	C004, C006, C008, C016, C051, C058	Film capacitor	0.1 µF	AMFF0050J104	Nissei	C016 not mounted
1	C009	Film capacitor	0.068 µF	AMFF0050J683	Nissei	
5	C010, C011, C013, C014, C055	Ceramic capacitor	0.1 µF	RPE132F104Z50	Murata	
1	C012	AL ELE capacitor	10 µF/16 V	SME16VB10M	ELNA	
5	C015, C052, C053, C054, C057	AL ELE capacitor	100 µF/16 V	ROA-16V101M	ELNA	C015 not mounted
1	C056	Tantalum capacitor	10 µF/16 V	DN1C100M1S	NEC	
2	C101, C102, C017, C018	AL ELE capacitor	10 µF/16 V	R3A-16V100M	ELNA	
2	C103, C104	Film capacitor	0.027 µF	APSF0100J273	Nissei	
4	C105, C106, C107, C108	Film capacitor	8200 pF	APSF0100J822		C017, C108 not mounted
1	L001	Inductor				Not mounted

Table 2-2. Bill of Materials (continued)

Qty	RefDes	Item	Value	Mfr Part No	Manufacturer	Remarks
1	FIL001	Filter				Not mounted
1	CN003	L-type connector		57LE40360-7700(D3)	Yamaichi	
1	CN004	48-pin connector		FFC-48BMEP1	Yamaichi	
3	CN002, CN058, JP002	2-pin connector		FFC-2BMEP1	Yamaichi	
1	CN104	RCA connector (red)		LPR6520-0802	SMK	
1	CN103	RCA connector (white)		LPR6520-0803	SMK	
1	CN001	RCA connector (yellow)		LPR6520-0804	SMK	
1	CN051	Banana jack (yellow)		T-45(Yellow)	Honda	
1	CN052	Banana jack (green)		T-45(Green)	Honda	
1	CN053	Banana jack (blue)		T-45(Blue)	Honda	
2	CN054, CN056	Banana jack (red)		T-45(Red)	Honda	
2	CN055, CN057	Banana jack (black)		T-45(Black)	Honda	
4	CN101, CN102, CN006, CN007	Connector 20-pin		XB-3-7-20	MAC8	CN006, CN007 not mounted
1	D001	Diode		1SS133	ROHM	
1	JP001	4-pin connector		FFC-4BMEP1	Yamaichi	
1	R001	Resistor	75 Ω	SN14C2C-75ΩF	KOA	
1	R003	Resistor	47 kΩ	SN14C2C-47kΩF	KOA	
2	R002, R004	Resistor	470 Ω	SN14C2C-470ΩF	KOA	
4	R101–R104	Resistor	220 Ω	SN14C2C-220ΩF	KOA	
4	R105–R108	Resistor	180 Ω	SN14C2C-180ΩF	KOA	
4	R109–R112	Resistor	200 Ω	SN14C2C-200ΩF	KOA	
2	R113, R114	Resistor	100 Ω	SN14C2C-100ΩF	KOA	
1	RA001	Resitor array	47 kΩ × 5	M6-1-473J	BI	
1	U001	TOSLINK™ connector		TORX179P	Toshiba	
1	U002	Digital audio I/F receiver IC		CS8414-CS	Cirrus Logic	
1	U003	Logic IC		TC74VHC14F	TI	
1	U004	Logic IC		TC74HCT32AF	TI	
2	U005, U006	Logic IC		TC74VHC244F	TI	
1	U051	Regulator IC		REG1117-3.3	TI/BB	
2	U101, U102	IC socket, DIP 8-pin		100-008-000	3M	
3	SW001, SW002, SW003	DIP switch		FT1D-2M	Fujisoku	
1	SW004	Push switch		FP1F-2M	Fujisoku	
1	SW005	DIP switch (″)		FT2D-2M	Fujisoku	
1	SW006	DIP switch (‴)		DSS104	Fujisoku	
4	—	Spacer		AR-325B	Nakao	
3	JP101–JP103					

Revision History

Changes from Original (September, 2004) to A Revision **Page**

- Updated document format to current standards..... 5
- Added PCM1795 to devices relevant to this user guide 5

NOTE: Page numbers for previous revisions may differ from page numbers in the current version.

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EVM WARNINGS AND RESTRICTIONS

It is important to operate this EVM within the input voltage range of ±15 V and the output voltage range of ±15 V.

Exceeding the specified input range may cause unexpected operation and/or irreversible damage to the EVM. If there are questions concerning the input range, please contact a TI field representative prior to connecting the input power.

Applying loads outside of the specified output range may result in unintended operation and/or possible permanent damage to the EVM. Please consult the EVM User's Guide prior to connecting any load to the EVM output. If there is uncertainty as to the load specification, please contact a TI field representative.

During normal operation, some circuit components may have case temperatures greater than +55°C. The EVM is designed to operate properly with certain components above +55°C as long as the input and output ranges are maintained. These components include but are not limited to linear regulators, switching transistors, pass transistors, and current sense resistors. These types of devices can be identified using the EVM schematic located in the EVM User's Guide. When placing measurement probes near these devices during operation, please be aware that these devices may be very warm to the touch.

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